

SMART CARD PERSONALIZATION ASSISTANCE TOOL

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RELATED APPLICATIONS

10 This application claims priority under 35 USC 119(e) from the
Provisional Application No. 60/464,559 (Attorney Docket Number
VISAP076P) entitled "Smart Card Personalization Assistance Tool," which
was filed on April 21, 2003, and which is hereby incorporated by reference.

BACKGROUND OF THE INVENTION

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1. Field of the Invention

The invention relates to the personalization of smart cards.

2. Description of the related art

20 The present invention is applicable to smart cards. Also termed chip
cards, integrated circuit cards, memory cards or processor cards, a smart card
is typically a credit card-sized plastic card that includes one or more
semiconductor integrated circuits. A smart card can interface with a point-of-
sale terminal, an ATM, or with a card reader integrated with a computer,
telephone, vending machine, or a variety of other devices. The smart card may
be programmed with various types of functionality such as a stored-value
25 application, a credit or debit application, a loyalty application, cardholder
information, etc. Although a plastic card is currently the medium of choice for
smart cards, it is contemplated that a smart card may also be implemented in a
smaller form factor, for example, it may attach to a key chain or be as small as
a chip module. A smart card may also be implemented as part of a personal
30 digital assistant, telephone, or take a different form. The below description

provides an example of the possible elements of a smart card, although the present invention is applicable to a wide range of types of smart cards.

5 A smart card may include a microprocessor, random access memory (RAM), read-only memory (ROM), non-volatile memory, an encryption module (or arithmetic unit), and a card reader (or terminal) interface. Other features may be present such as optical storage, flash EEPROM, FRAM, a clock, a random number generator, interrupt control, control logic, a charge pump, power connections, and interface contacts that allow the card to communicate with the outside world. Of course, a smart card may be
10 implemented in many ways, and need not necessarily include a microprocessor or other features.

The microprocessor is any suitable central processing unit for executing commands and controlling the device. RAM serves as temporary storage for calculated results and as stack memory. ROM stores the operating system,
15 fixed data, standard routines, look up tables and other permanent information. Non-volatile memory (such as EPROM or EEPROM) serves to store information that must not be lost when the card is disconnected from a power source, but that must also be alterable to accommodate data specific to individual cards or changes possible over the card lifetime. This information
20 includes a card identification number, a personal identification number, authorization levels, cash balances, credit limits, and other information that may need to change over time. An encryption module is an optional hardware module used for performing a variety of encryption algorithms. Of course, encryption may also be performed in software.

25 The card reader interface includes the software and hardware necessary for communication with the outside world. A wide variety of interfaces is possible. By way of example, the interface may provide a contact interface, a close-coupled interface, a remote-coupled interface, or a variety of other interfaces. With a contact interface, signals from the integrated circuit are
30 routed to a number of metal contacts on the outside of the card which come in

physical contact with similar contacts of a card reader device. A smart card may include a traditional magnetic strip to provide compatibility with traditional card reader devices and applications, and may also provide a copy of the magnetic stripe information within the integrated circuit itself for compatibility.

Various mechanical and electrical characteristics of a smart card and aspects of its interaction with a card reader device are described in *Smart Card Handbook*, W. Rankl and W. Effing, John Wiley & Sons, Ltd., 1997, and are defined by the following specifications, all of which are incorporated herein by reference: *Visa Integrated Circuit Card Specification*, Visa International Service Association, 1996; *EMV Integrated Circuit Card Specification for Payment Systems*, *EMV Integrated Circuit Card Terminal Specification for Payment Systems*, *EMV Integrated Circuit Card Application Specification for Payment Systems*, Visa International, Mastercard, Europay, 1996; and *International Standard; Identification Cards - Integrated Circuit(s) Cards with Contacts, Parts 1-6*, International Organization for Standardization, 1987-1995.

To facilitate understanding, FIG. 1 is a block diagram of a prior art system used for the personalization of a smart card. A data preparation table of values 138 and an input file 159 provide input to a preparation processing device 154. The preparation processing device 154 has two-way communications with a hardware security module 130. The preparation processing device 154 provides an output file 160, which provides input to a personalization device 150. The personalization device 150 has two-way communication with a hardware security module 152. A card supplier 170 also provides input to the personalization device 150. The personalization device 150 takes blank smart cards 172 and output personalized smart cards 180.

The data preparation tables are used to specify various options that a card issuer may desire for a smart card such as offline limits, language preferences, and card holder verification methods.

In addition to the encoding and embossing data on a smart card, there may be over forty chip data elements that need to be incorporated into the card personalization process. Some of the mandates for these data elements may be specified in the data preparation table of values 138. The data elements are identified by tag, length, and value.

Previously in order to create such tables, templates have been used to suggest table values for various card preferences. Independent programmers would create a table specifying various values. The programmers would need to know complex details about the table to correctly determine values for the table. Choosing appropriate values for the table is often too confusing and could lead to personalization errors. In addition, the process of choosing appropriate values may become too mired in the technical details, causing the user to lose sight of the business and risk management decisions that should dictate the selection of values. This process may require business people and technical people to complete this process. This may require accurate communication between the technical people and business people to reflect the desired business decisions.

FIG. 2 is a block diagram illustrating in further detail generating a data preparation table of values, used in the prior art. A stand-alone system 190 is an independent computer or computer system. Templates 192 reside on the stand alone system 190. In the alternative, the templates 192 may be a printed document that is referred to by the user of the stand alone system 190. The templates 192 are used as references or suggestions. However, a user might use the stand alone system to create a data preparation table of values 138, ignoring all of the suggestions of the template.

The complex nature of chip card personalization and the ability to generate data preparation table of values that ignore or are contrary to template suggestions has led to discrepancies in the process that in some cases have resulted in interoperability problems. Chip cards issued in one country or region, may experiencing acceptance problems when being used in terminals in other countries and regions, if data in the data preparation table of values is not correct.

A chip card may have base applications already loaded by the chip card manufacturer. The operation of the application is driven by the data elements in the data preparation table of values. The interdependency of data elements may make the process of defining the data elements more complex.

5 Therefore, the prior art system was difficult to use and provided an output that could cause interoperability problems.

SUMMARY OF THE INVENTION

10 These and other features of the present invention will be described in more details below in the detailed description of the invention and in conjunction with the following figures.

15 Member banks need a clear and easy way to tailor their debit/credit applications to best suit their domestic and regional market needs. The current method Members use for selecting and choosing the appropriate values can be confusing and potentially can lead to personalization errors. Too often Members become mired in the technical details and lose sight of the business and risk management decisions that should dictate their application selections. The personalization assistant is a user-friendly tool designed to help Members tailor their VSDC programs to their specific needs and to help to facilitate a
20 seamless migration to chip.

25 The personalization assistant guides issuers through the decision-making process of selecting their desired debit/credit options. Issuers are requested to respond to a series of business questions. Responses to these questions will be used by the tool to generate a set of debit/credit parameters and values, representing the issuer's business and risk requirements for the debit/credit application. In this document, the set of debit/credit parameters and values is referred to as the "Data Preparation Output File" (or Personalization Assistant Output File).

Throughout the process, the personalization assistant will assist the Member with best practice suggestions, default values, mandatory settings and help screens. The actual mechanics of capturing the data to be used in the data preparation process will be transparent to the Issuer who is then free to focus
5 on the business/risk management aspects of this process. The set of chosen parameters and their values generated by the tool is uniquely identified and retained in a "Member Profile." This Profile can be copied and modified later by the same Issuer in order to create additional profiles that contain parameter or value modifications needed to meet different business requirements.

10 Once a "Data Preparation Output File" is created, it can be exported for use both in the personalization data preparation process and by the tool used to validate correct personalization of the card's debit/credit application. Various reports of the Issuer's business/risk management decisions can also be displayed noting any deviation from Visa's best practice suggestions. The use
15 of mandatory settings and best practice suggestions will minimize the potential for interoperability problems in both domestic and international markets.

Other features and benefits include the ability to communicate updated information on rules, application best practices, and changes in a timely manner.

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BRIEF DESCRIPTION OF THE DRAWINGS

The present invention is illustrated by way of example, and not by way of limitation, in the figures of the accompanying drawings and in which like reference numerals refer to similar elements and in which:

25 FIG. 1 is a block diagram of a prior art system used for the personalization of a smart card.

FIG. 2 is a block diagram illustrating in further detail generating a data preparation table of values, used in the prior art.

FIG. 3 is a block diagram of a personalization system used in a preferred embodiment of the invention.

5 FIG 4 is a high level flow chart of a process used by the personalization system.

FIG. 5 is a more detailed flow chart of a step of generating a personalization data file from the responses to the plurality of queries for an embodiment using a lookup table.

10 FIGS. 6 and 7 illustrate a computer system, which is suitable for implementing the web host or local systems used in embodiments of the present invention.

FIG. 8 is a block diagram of an example of an embodiment of the invention.

15 FIG. 9 is a block diagram of an example of a personalization database.

FIG. 10 is a view of a profile listing screen.

FIG. 11 is a view of a page report type page.

FIG. 12 is a view of a modify profile option page.

FIG. 13 is a view of a start new profile page.

20 FIG. 14 is a view of a search profile page.

FIG. 15 is a view of a default profile web page.

FIG. 16 is a view of a feature selection page.

FIG. 17 is a view of an account data web page for account usage controls.

FIG. 18 is a view of an account data web page for application identification.

5 FIG. 19 is a view of an account data web page for application confirmation.

FIG. 20 is a view of an account data web page for customizing the account name of the application to be displayed in a specific language.

10 FIG. 21 is a view of an account data web page for customizing account language.

FIG. 22 is a view of an account data web page for prioritizing the account.

FIG. 23 is a view of an account data web page for account risk management decisions.

15 FIG. 24 is a view of an offline authorization control web page for offline risk management control.

FIG. 25 is a view of an offline authorization control web page for offline limits and thresholds.

20 FIG. 26 is a view of an offline authorization control web page for setting account effective date checking.

FIG. 27 is a view of an offline authorization control web page for offline risk management decisions.

FIG. 28 is a view of a web page for cardholder verification method selection.

25 FIG. 29 is a view of a web age for a PIN Try Limit.

FIG. 30 is a view of a first web page of the CVM Assistant Questionnaire Method 1.

FIG. 31 is a view of a second web page of the CVM Assistant Questionnaire Method 1

5 FIG. 32 is a view of a cardholder verification method summary web page.

FIG. 33 is a view of a web page for the CVM Method 2.

FIG. 34 is a view of a terminal risk management web page.

FIG. 35 is a view of an offline dynamic data authentication web page.

10 FIG. 36 is a view of a web page for Offline Data Authentication Risk Management Decisions.

FIG. 37 is a view of a web page for card authentication options.

FIG. 38 is a view of a web page for issuer authentication options.

15 FIG. 39 is a view of a web page for issuer script risk management decisions.

FIG. 40 is a view of a first web page for a low-value payment feature.

FIG. 41 is a view of a second web page for the low-value payment feature.

FIG. 42 is a view of a third web page for low-value payment.

20 FIG. 43 is a view of a fourth web page for low-value payment.

FIG. 44 is a view of a fifth web page for low-value payment.

FIG. 45. is a view of an output options page.

FIG. 46 is a view of a business report.

FIG. 47 is a view of a technical report.

FIG. 48 is a view of a stand-in options report.

FIG. 49 is an example of a data schema that may be used in an
5 embodiment of the invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention will now be described in detail with reference to
a few preferred embodiments thereof as illustrated in the accompanying
10 drawings. In the following description, numerous specific details are set forth
in order to provide a thorough understanding of the present invention. It will
be apparent, however, to one skilled in the art, that the present invention may
be practiced without some or all of these specific details. In other instances,
well known process steps and/or structures have not been described in detail in
15 order to not unnecessarily obscure the present invention.

FIG. 3 is a block diagram of a personalization system 300 used in a
preferred embodiment of the invention. In this system a first local system 304
and a second local system 306 are connected to the Internet 312. A web host
316 is also connected to the Internet 312. The web host 316 includes a
20 personalization assistant software application 320 (or “personalization
assistant tool”). The personalization assistant software application 320
includes or is in communication with a look up table 324. The web host 316
is connected to a preparation processing device 154 and a personalization
validation tool 344.

25 In an alternative embodiment, the data preparation table of values is
stored on the local systems 304, 306. In such a case, the local systems 304,
306 may be connected to the preparation processing device and may send the

data preparation table of values to the preparation processing device 154. In such a case, approved data preparation table of values may have an indicator of whether they are approved, with the preparation processing device only accepting approved data preparation of values.

5 FIG 4 is a high level flow chart of a process used by the personalization system 300. The web host 316 provides a log on screen to users of the local systems 304, 306 (step 404). After the users of the local system 304, 306 successfully log on, the web host 316 provides users of the local systems 304, 306 with a plurality of queries regarding smart card features
10 (step 408). The users of the local systems 304, 306 provide responses to the queries. The responses to the plurality of queries are received by the web host 316 (step 412). The web host 316 generates a personalization data file from the responses to the plurality of queries (step 416). In this embodiment, the personalization data file is sent to a preparation processing device 154, which
15 uses individual input files and the personalization data file to generate a plurality of personalized smart cards (step 420). In one implementation, the preparation processing device 154 does this by generating an output file from the personalization data file and the individual input files. The output file is then sent to a personalization device, which uses the output file to generate
20 personalized smart cards. In another implementation, the preparation processing device performs the actual personalization on the smart cards. In other embodiments, the web host may be able to generate the smart cards.

 The sending of the plurality of queries (step 408) may occur simultaneously with the receiving user responses (step 412). This may be
25 done by sending one or more queries at a time and then receiving responses before sending one or more additional queries.

 FIG. 5 is a more detailed flow chart of the step of generating the personalization data file from the responses to the plurality of queries (step 416) for an embodiment using a lookup table. During this step the
30 personalization assistant finds a matching entry in the look up table 324 that

matches the responses to the plurality of queries (step 504). The look up table may be a table of entries, where each entry is a possible combination of response to the plurality of queries. The look up table 324 associates each entry with output data. The output data associated with the matching entry is then located (step 508). The output data associated with the matching entry is then outputted into a personalization data file (step 512).

Some embodiments may use some programming logic in addition to a look up table to generate the data preparation table of values. Other methods not using a look up table may be used to generate the data preparation table of values. Such other methods may use a knowledge based system with artificial intelligence or some other system.

FIGS. 6 and 7 illustrate a computer system 600, which is suitable for implementing the web host or local systems used in embodiments of the present invention. FIG. 6 shows one possible physical form of the computer system. Of course, the computer system may have many physical forms ranging from an integrated circuit, a printed circuit board, and a small handheld device up to a huge super computer. Computer system 600 includes a monitor 602, a display 604, a housing 606, a disk drive 608, a keyboard 610, and a mouse 612. Disk 614 is a computer-readable medium used to transfer data to and from computer system 600.

FIG. 7 is an example of a block diagram for computer system 600. Attached to system bus 620 is a wide variety of subsystems. Processor(s) 622 (also referred to as central processing units, or CPUs) are coupled to storage devices, including memory 624. Memory 624 includes random access memory (RAM) and read-only memory (ROM). As is well known in the art, ROM acts to transfer data and instructions uni-directionally to the CPU and RAM is used typically to transfer data and instructions in a bi-directional manner. Both of these types of memories may include any suitable of the computer-readable media described below. A fixed disk 626 is also coupled bi-directionally to CPU 622; it provides additional data storage capacity and

may also include any of the computer-readable media described below. Fixed disk 626 may be used to store programs, data, and the like and is typically a secondary storage medium (such as a hard disk) that is slower than primary storage. It will be appreciated that the information retained within fixed disk 626 may, in appropriate cases, be incorporated in standard fashion as virtual memory in memory 624. Removable disk 614 may take the form of any of the computer-readable media described below.

CPU 622 is also coupled to a variety of input/output devices, such as display 604, keyboard 610, mouse 612 and speakers 630. In general, an input/output device may be any of: video displays, track balls, mice, keyboards, microphones, touch-sensitive displays, transducer card readers, magnetic or paper tape readers, tablets, styluses, voice or handwriting recognizers, biometrics readers, or other computers. CPU 622 optionally may be coupled to another computer or telecommunications network using network interface 640. With such a network interface, it is contemplated that the CPU might receive information from the network, or might output information to the network in the course of performing the above-described method steps. Furthermore, method embodiments of the present invention may execute solely upon CPU 622 or may execute over a network such as the Internet in conjunction with a remote CPU that shares a portion of the processing.

In addition, embodiments of the present invention further relate to computer storage products with a computer-readable medium that have computer code thereon for performing various computer-implemented operations. The media and computer code may be those specially designed and constructed for the purposes of the present invention, or they may be of the kind well known and available to those having skill in the computer software arts. Examples of computer-readable media include, but are not limited to: magnetic media such as hard disks, floppy disks, and magnetic tape; optical media such as CD-ROMs and holographic devices; magneto-optical media such as floptical disks; and hardware devices that are specially configured to

store and execute program code, such as application-specific integrated circuits (ASICs), programmable logic devices (PLDs) and ROM and RAM devices. Examples of computer code include machine code, such as produced by a compiler, and files containing higher level code that are executed by a computer using an interpreter. Computer readable media may also be computer code transmitted by a computer data signal embodied in a carrier wave and representing a sequence of instructions that are executable by a processor.

EXAMPLE

FIG. 8 is a block diagram of an example of an embodiment of the invention. A responses to a plurality of queries form business decisions 804, which are provided as input to the personalization assistant 320. The personalization assistant creates a data file (or data preparation table of values) 138. The personalization assistant 320 may also be used to create a paper record 808 and screen report 812, which may be used to form another paper record 816. The data file 138 and an input file 159 are inputted into a preparation processing device 154 to provide an output file, which is sent to a personalization device 150. The personalization device 150 uses the output file to personalize a chip card 180. Generally, a single data file with a plurality of input files may be used to provide one or more output files used to personalize a plurality of smart cards. A personalization validation tool 344 may be used to compare the data file 138 with the smart card 180 to validate the smart card. The personalization validation tool 344 creates a validation paper record 830 to validate business decisions and a screen report 834 designating if the smart card 180 contains data that violates rules or best practices defined by the card scheme. The screen report 834 may be used to provide a paper record 838.

In an example of a process in an embodiment of the invention, to proved a log on process (step 404) a log-on web page is provided by the web host that would allow a user to log on to the web host (step 404). The log on web page requests a users username and password. This provides security, 5 that keeps users from viewing or changing other user's data. Once logged in the user may be presented with a home page that allows the user to select the personalization assistant and run the personalization assistant application. Running the personalization assistant application may provide an Early/Full Data Options Decision page. This page allows the user to indicate the 10 appropriate data options that apply to both the issuer host environment and the domestic acquiring environment of the user. For an issuer, if an issuer is not able to receive all of the chip data then the Early Data Option is selected. This selection limits the Issuer in the amount of chip data they are able to receive. For an issuer, if the issuer is able to receive all of the chip data then a Full 15 Data Option is selected. The issuer receives all of the chip data fields. Similarly, an Early Acquirer truncates a message only sending some of the fields of data for an Early Data Option, and sends a full message with all of the data fields if a Full Data Option is selected. The inventive personalization tool is able to provide different best practices recommendations depending on 20 whether an early or full environment is used.

The user is then brought to a business profile selection menu, which allows a user to build a new member profile or to select an existing member profile, only if a new profile has been previously created. Another option allows the user to select a recommended profile. If the user chooses to build a 25 new member profile from an existing member profile, then a profile listing screen 1004, as shown in FIG. 10, is provided. The profile listing screen 1004 allows a user to select any of the listed profiles 1008 and then choose a button to modify a profile 1012, a button to view details of the profile 1016, a button to add a profile 1020, or a button to search profiles 1024.

5 If the user selects the button to view details of the profile 1016, then a page report type page 1104 is provided, as shown in FIG. 11. The report type page 1104 allows a user to choose to generate a business report, generate a technical report, generate a data preparation output file, or generate a stand-in settings report.

10 If a user selects the button to modify a profile 1012, a pop-up window would be displayed in case the selected profile contains best practice violations. The user is asked to confirm whether he/she wants to continue with the profile, or cancel the selection. If the selected profile doesn't contain any best practice violation, a modify profile option page 1204 is provided, as shown in FIG. 12. The modify profile option page 1204 provides the options of either archiving the current profile and creating a new profile based on the archived profile, or not archiving the current profile and modifying the current profile. It should be noted that profiles that are modified by a user will remain
15 in a pending state until a member user who has supervisor privilege can change the profile status to "active". On making the appropriate selection the user would click on the Next button.

20 If a user selects the button to add a profile 1020, a start new profile page 1304 is provided, as shown in FIG. 13. The start new profile page 1304 queries the user for a profile label 1308, a bank identification number (BIN) 1312, and an account range 1316. The new profile will remain in a pending state until a member user who has supervisor privilege can change the profile status to "active".. After all requested information has been entered, the user should click on the "Next" button 1320 to proceed to the next screen. The
25 next screen provides the user with a summary of selected smart debit/credit card features.

30 If a user selects the button to search profiles 1024, a search profile page 1404 is provided, as shown in FIG. 14. The search profile page 1404 allows a user to search from a list of active or inactive profiles over a period defined by the user. The user may search by bank identification number (BIN)

or account range. To perform a search, a user would enter the required information and then click on the continue 1408 button.

5 If in the business profile selection menu the user selects the use of a recommended profile, a default profile web page 1504 is provided, as shown in FIG. 15. The default profile web page 1504 provides the options of viewing the details of the default profile and creating a new profile based on the default profile.

FIG. 9 is a block diagram of an example of a personalization database 900. The personalization database provides a hierarchy of profiles that is used
10 to provided default and recommended profiles. A universal personalization assistant center profile database 904 is provided. The universal center can maintain multiple profiles per product. These profiles may be used as default and recommended profiles. The profiles may be used globally for all regions. A personalization assistant regional profile database 908 is provided. Usage is
15 divided into several regions. Each region may contain several countries. One region may be Latin America and the Caribbean. Each region would take one or more of the recommended or default profiles in the universal personalization assistant center profile database 904 and tailor the one or more default or recommended profiles according to regional preferences and
20 requirements and place these as default and recommended profiles in the personalization assistant regional profile database 908. A personalization assistant country profile table 912 is provided. An example of a country in the Latin America and the Caribbean region is Brazil. Each country would take one or more of the recommended or default profiles in the personalization
25 assistant region profile database 908 and tailor the one or more default or recommended profiles according to country preferences and requirements and place these as default and recommended profiles in the personalization assistant country profile database 912. Each country can have multiple country/domestic profiles associated to it, identified by the country and region
30 code. If a country is in a region that does not have default or recommended

profiles, then the country may use the global profiles. An issuer profile table 916 is provided. Each issuer can have multiple issuer profiles associated to it, identified by the business identification, country code, account range, and profile identification. The issuer would take one or more of the recommended or default profiles in the personalization assistant country profile database 912 and tailor the one or more default or recommended profiles according to issuer preferences and requirements and place these as default and recommended profiles in the personalization assistant issuer profile database 916. The base profile table contains a list of all profiles and configurations for international, regional, country, and issuer profiles. The personalization assistant base profile table 920 provides input for a personalization assistant profile data table 924. The personalization assistant profile data table contains a list of all tags and values associated to it. Each profile has mandatory, recommended, and default settings or values for the various features or functions and tag lengths and values that correspond to the setting or values for the profile.

A personalization assistant level rules table 925 is provided. The personalization assistant level rules table 925 contains a list of all tags and values associated with every level profile and stores the rules per profile. The personalization assistant level rules table 925 provides input to a personalization assistant BP rules table 928.

On completion of the profile selection process that defines the default profile to be used for building a new profile, the personalization assistant application presents a user with a feature selection page 1604, as shown in FIG. 16. This page outlines the mandatory features that must be supported by an issuer along with optional features that users can select or deselect. Some of the mandatory features listed are "Account Data," Cardholder Verification Methods" (CVMs), "Terminal Risk Management," and "Card Authentication." These items as shown, are not next to a check box, since they cannot be selected or deselected, since they are mandatory. Optional features listed are "Offline Authorization Controls," "Offline Static Data

Authentication” (SDA), “Offline Dynamic Data Authentication” (DDA),
“Issuer Authentication,” “Issuer-Script Processing,” and “Visa Low-Value
Payment” (VLP). These items as shown, are next to a check box to allow a
user to select or deselect the optional feature. The personalization assistant
5 tool has some of the check boxes for the optional features pre-checked, where
the pre-checked items are either built in recommendations or best practices. If
a user deselects a pre-checked item, the personalization assistant tool provides
a warning window that informs the user that they are about to violate a
recommendation or best practice and asks if they are sure if they want to do
10 that. As a result, the personalization assistant tool is able to provide
mandatory features and optional features with implemented recommendations
and best practices.

If during the selection or deselection of a feature or function, the user
changes an option that results in a violation of current best practice, the
15 personalization assistant provides a warning box to the user, to alert the user
to the violation. The following screens depend on the features selected by a
user. In this example, it is presumed that all features have been selected. On
this web page and all subsequent web pages that appear during the feature and
function selection process, the user may at any time click on the “Profile
20 Complete” button 1608, to complete the profile building process; the “Save”
button 1612, to save current setting and remain on the current screen; the
“Back” button 1616, to return to the previous screen; the “Next” button 1620,
to save current settings and to proceed to the next screen; or the “Cancel”
button 1624 cancel all settings selected by the user on this page.

25 **Account Data**

FIG. 17 is a view of an account data web page for account usage
controls 1704. This page allows a user to define where a card may be used
geographically (internationally only, domestically only, or both internationally
and domestically) for each of the services provided by the card, i.e. goods and
30 services, cash and cash back. In the case either domestic or international

usage is checked (i.e. not both are checked), the system will pop up a question asking if the card will support a geographic restriction check. The user may also define if the card can be used at Automatic Teller Machines (ATM) and at devices other than ATMs, such as point of sale devices.

5 FIG. 18 is a view of an account data web page for application identification 1804. For issuers who choose to have more than one credit or debit application, using the same application identifier for each, this page allows a user to uniquely identify each of these applications using additional information referred to as the application identifier extension.

10 FIG. 19 is a view of an account data web page for application confirmation 1904. This page allows the user to indicate whether there are multiple payment applications on the card. If multiple applications are present, the user has the option on this screen to set the current configure application to require that the cardholder confirm the application's use before
15 a transaction is performed. If confirmation is not requested then a terminal would select an application with the highest priority, without requesting confirmation.

 FIG. 20 is a view of an account data web page for customizing the account name of the application to be displayed in a specific language 2004.
20 This page allows the account name of the application to be displayed in a specific language to be customized so that in the event a terminal supports the language of choice, the account name would be displayed to the cardholder in that language.

 FIG. 21 is a view of an account data web page for customizing account
25 language 2104. The page, in this example, allows the issuer to define up to four languages of choice, so that in the event a terminal in use supports any of these languages, the display messages provided by the terminal will be displayed in the chosen language.

FIG. 22 is a view of an account data web page for prioritizing the account 2204. This page allows a user to set a required priority order by which a terminal should select an application, assuming that multiple payment applications are being supported on the card.

5 FIG. 23 is a view of an account data web page for account risk management decisions 2304. This page allows a user to set either decline offline, send online, or decline options, if online unavailable for various risk management results that may be detected by a terminal during transaction processing. For example, if a terminal determines that a card is expired an
10 issuer may choose to have the card declined offline at the point of transaction, or send the transaction online to the issuer, or to send the transaction online to the issuer but decline offline if an online connection is unavailable. If the terminal is not able to connect online or the connection is down, the decline if online unavailable option would decline the card offline.

15 **OFFLINE AUTHORIZATION CONTROL**

FIG. 24 is a view of an offline authorization control web page for offline risk management control 2404. This page allows a user to specify whether the card, terminal or both should perform risk management checks.

FIG. 25 is a view of an offline authorization control web page for
20 offline limits and thresholds 2504. This web page allows the user to select appropriate counter limits, amount limits, secondary currency definitions, etc. that are required for card and terminal velocity checking. For example an offline limit may provide that a maximum of three offline transactions may occur before an online transaction is required and the number of consecutive
25 offline transactions that are allowed before declining a transaction when an online transaction cannot be completed. In this example, a mandatory requirement is placed so that the issuer must allow at least two offline transactions between online transactions. Threshold limits may be set on offline international transactions and amount limits

FIG. 26 is a view of an offline authorization control web page for setting account effective date checking 2604. This page allows the user to determine if an application effective date is required on the account and the action to be taken if a cardholder attempts to use the card before the account date becomes effective. The options, in this example, are to decline the transaction offline, send the transaction online, or send the transaction online but decline if an online connection is not available.

FIG. 27 is a view of an offline authorization control web page for offline risk management decisions 2704. This page allows a user to set either decline offline, send online, or decline if online unavailable options for various offline risk management results that may be encountered by a terminal during transaction process. Examples include; if the card is new, if card data is missing, and if the lower and upper limits specified by the user for offline use have been exceeded. For example, an offline limit may provide that a maximum of three offline transactions may occur before an online transaction is required.

CARD VERIFICATION METHODS

FIG. 28 is a view of a web page for cardholder verification method selection 2804. The page provides a user with a choice of two methods for preparing the user's cardholder verification methods list. A Method 1 option offered by the web page provides a series of questions. Based on the user's response to the question the personalization assistant generates an appropriate cardholder verification method list. A Method 2 option offered by the web page allows a user to create the user's own cardholder verification method list. Under Method 2, a review is made of the cardholder verification method list before the profile is activated. If either method indicates offline PIN support, a user will be provided by a PIN Try Limit web page 2904, as shown in FIG. 29, to allow the entry of the PIN Try Limit and the action to be taken in event a cardholder exceeds the PIN Try Limit during transaction processing.

If Method 1 is selected, a Card Verification Method Assistant Questionnaire Method 1 process is performed. A first web page of the CVM Assistant Questionnaire Method 1 3004 is shown in FIG. 30. This page allows a user to indicate if they require separate CVM lists for domestic and international transactions. This allows the support of two CVM lists on a single application.

A second web page of the CVM Assistant Questionnaire Method 1 3104 is shown in FIG. 31. Some of the questions on this page are: Will you allow your cardholder to be validated using offline plaintext PIN? Will you allow your cardholder to be validated using offline Enciphered PIN? At ATMs supporting both offline PIN and online PIN, should offline PIN be used instead of online PIN?

A cardholder verification method summary web page 3204 is then provided, as shown in FIG. 32. This page provides a summary of the features selected by the user.

FIG. 33 is a view of a web page for the CVM Method 2 3304. This page provides the users with options of designating if the CVM is for domestic, international, or both, and for providing Amount X and Amount Y, and for providing application currency code. The page also provides fields for selecting the Cardholder Verification Method to use, when to use this verification method, and the action to take if this cardholder verification method is not successful.

CARDHOLDER VERIFICATION RISK MANAGEMENT DECISIONS

FIG. 34 is a view of a terminal risk management web page 3404. This page allows a user to select decline transaction offline, send online, or decline if online is unavailable for various decisions. Examples of some of these decisions are: If cardholder verification is not successful, what action should be take? If one of the card holder methods in the card's CVM list is not

recognized by the terminal, what action should be taken? If an offline PIN is required and the PIN pad is not working or not present, what action should be taken? If an offline PIN is required and the PIN pad is present but the cardholder's PIN is not entered, what action should be taken? If the Offline PIN try limit is exceeded, what action should be taken? A series of Yes and No questions may also be provided. Examples of some of these questions are: If the offline PIN try limit is exceeded on the current transaction and the transaction is declined offline, should an advice be created? If the offline PIN is exceeded on the current transaction, should the application be blocked? If the offline PIN try limit is exceeded on the previous transaction, should the transaction be declined offline?

OFFLINE DYNAMIC DATA AUTHENTICATION

The system provides two methods of offline data authentication, which are static and dynamic. In static authentication, a terminal reads static data from the card and runs the data through an algorithm to check to see if the data matches a signature on the card using RSA technology. This authentication is to detect whether data such as the expiration date of the card has been changed. Dynamic authentication provides static authentication, and in addition generates a dynamic signature for each transaction. For dynamic authentication, a private key may be stored on a card. A public key that matches the private key is placed in a certificate, which is read by a terminal. The terminal uses the public key to encrypt data, which is sent to the card. The card is able to validate the encrypted data using the private key.

FIG. 35 is a view of an offline dynamic data authentication web page 3504. The page allows the user to determine if additional terminal-based data elements should be used during the dynamic data authentication process. The EMV specifications require that at minimum, a randomly generated unpredictable number be used, but the user may specify additional data elements.

OFFLINE DATA AUTHENTICATION RISK MANAGEMENT DECISIONS

FIG. 36 is a view of a web page for Offline Data Authentication Risk Management Decisions 3604. This page provides options for the user to set either decline offline, send online, or decline if online is unavailable for various static or dynamic offline data authentication risk management results that may be encountered by the terminal during transaction processing.

CARD AUTHENTICATION OPTIONS

FIG. 37 is a view of a web page for card authentication options 3704.

10 This card authentication process is an online process. This page allows the user to select the appropriate cryptogram version number for the application cryptogram that may be sent online for validation by the issuer. This page provides a detailed description of each version. In this example, the DES encryption process is used. The card contains the DES secret key, which is only known to the issuer. In this process, the card creates a cryptogram using the secret key and data from the card and terminal. The cryptogram is sent to the issuer. Since the issuer holds a master of the secret key, the issuer is able to validate the cryptogram.

ISSUER AUTHENTICATION OPTIONS

20 FIG. 38 is a view of a web page for issuer authentication options 3804. This page allows the user to indicate whether issuer authentication should be performed as an optional feature or should be mandatory. It also provides the user with additional actions to be performed in the event of a failure of issuer authentication. In issuer authentication, the card validates that the information came from the right issuer. In this example a DES key is used.

25

ISSUER SCRIPT RISK MANAGEMENT DECISIONS

FIG. 39 is a view of a web page for issuer script risk management decisions 3904. This page allows the user to indicate whether the next transaction should be sent online following the application's failure to process an issuer script. Issuer script is used by an issuer to update a smart card. When a card is issued to a new cardholder, an issuer may place more stringent controls in the smart card. As the relationship with the cardholder develops and the issuer begins to trust the cardholder more, the issuer may send script through issuer script processing to the smart card that makes the controls more lenient. The issuer script processing may be accomplished when the cardholder places a card in a terminal. This process may be invisible to the cardholder by performing the issuer script processing during a purchase transaction. This web page allows the issuer to decide what action to take if a issuer script process fails.

VISA LOW-VALUE PAYMENT (VLP) FEATURE

FIG. 40 is a view of a first web page for a low-value payment (VLP) feature 4004. The low-value payment feature is an optional feature that provides quick offline transaction processing for small-ticket purchases in single-currency markets. This page allows the user to select or change features associated with the low-value payment option. FIG. 41 is a view of a second web page for the low-value payment feature 4104. This page allows the user to indicate whether low-value payment should support the same cardholder verification methods used for the debit credit card or use separate ones. FIG. 42 is a view of a third web page for low-value payment 4204. If the user has indicated "no" to having the same cardholder verification methods used for both debit credit and low-value payment, this page will appear allowing the selection of a cardholder verification method. FIG. 43 is a view of a fourth web page for low-value payment 4304. If the user chooses to use the same cardholder verification methods for credit debit and low-value payment, this page will appear to verify the selection. Although this is

designated the fourth web page, it does not designate an order of appearance, since either the third or fourth web page appears, but usually not both during this process. FIG 44 is a view of a fifth web page for low-value payment 4404. This page allows the user to select the appropriate authorization code, low-value payment funds limit, and to indicate whether or not a low-value single transaction limit should apply.

DATA SCHEMA

FIG. 49 is an example of a data schema 4904 that may be used in an embodiment of the invention. The core function of the data schema is to create, store, and maintain universal, regional, country, and member profiles that contain mandatory, default, recommended, and selected settings. Some of the tables in the data schema are used to store profile specific data, while other tables are used as cross-references for setting appropriate value for the profile (lookup tables) or to support some administrative function (e.g. for providing e-mail notification). Generally, the User Information Table 4912, the Member Information Table 4916, the Base Profile Table 4920, the CVM Approval Table 4924, the Update Bulletin Table 4928, and the Profile Data Table 4932 are updated when a profile is added or modified. The remaining tables are normally not updated when a profile is added or modified.

An example of the lookup table is made up of the CVM tables, such as the VPA_CVM_QUESTION table 4908, the VPA_CVM_DATA_EMAIL table 4944, the VPA_CST_CVM_CONDITION table 4946, the VPA_CST_CVM_LIST table 4948, the VPA_CVM_APPROVAL table 4924, and the VPA_CST_CVM_TYPE table 4950. For example, for the Method 1 of CVM, the CVM Assistant Questionnaire Method 1 3104 of FIG. 31 is provided with seven “yes” and “no” questions. In this example, there are a set number (for example 64) different possible combinations of CVM (Card Verification Method) related answers to CVM Method 1 related questions in the questionnaire 3104. A user selects the answers to the questions in the questionnaire 3104 and submits the answers. The combination of answers is

compared to the combination of answers of various entries in the lookup table. When a matching combination of answers entry is found in the lookup table, an associated output is provided for the matching entry. FIG. 32 provides a summary of the customer CVM list based on the found associated output.

5 From a maintenance perspective, the questions in the CVM Method 1 questionnaire 3104 and the associated output in the lookup table may be easily changed without programmers, since the information is in a data table, instead of being part of the program logic. This allows easy rephrasing of questions in the questionnaire by changing data in the VPA_CVM_QUESTION table
10 4908.

 The VPA_CST_CURRENCY table 4936 is a table of all currency supported by the personalization assistant. For the web page for offline limits and thresholds 2504, a pull down menu 2508 is provided to allow the selection of a secondary currency. The entries for the pull down menu may be
15 generated from the VPA_CST-CURRENCY table 4936. The VPA_CST_CRYPTOGAM table 4938 provides a list of various cryptogram version numbers available for the application cryptogram. The data in the VPA_CST_CRYPTOGAM table 4938 may be used to generate the pull down menu for the cryptogram version number 3708 in FIG. 37. The use of
20 these types of tables such as the VPA_CST_CRYPTOGAM table 4938 is that a new cryptogram version may be added and supported merely by adding the new version to the VPA_CST_CRYPTOGAM table 4938. The program logic then lists all entries in the table at the appropriate places in the web pages. Similarly, new currency may be added or currency may be deleted by
25 adding or deleting the currency entry in the VPA_CST-CURRENCY table 4936. This allows the program logic to display new currency in the appropriate web pages without reprogramming computer logic.

 VPA_CST_TAG_ELEMENT table 4940 is a table of tag elements. This table lists descriptions for all tags and may reserve places for future tags.
30 This table also defines tag values and lengths for the different choices.

Adding new functionality to a tag may be achieved by changing definitions and tag values in the VPA_CST_TAG_ELEMENT table 4940.

PERSONALIZATION ASSISTANT OUTPUT OPTIONS

5 The output file is a direct translation from the profile. For many of the questions that are answered above, the answer to the question causes a tag value stored in the profile to be set. Programming logic uses the selected answer to set the tag value in the profile. In this example, a tag length and value (TLV) method are used. In this example, once a profile is completed the profile contains about 40 tags.

10 On completion of the profile creation process, the user will be taken to an output options page 4504, as shown in FIG. 45. On this page, the user may chose from a number of options for creating reports and output files. The choices for reports and output files include a business report, a technical report, a data preparation output file, and a stand-in options report. The
15 contents of all the reports and output files are based on responses made by the user to all of the business questions. The user may view, print, or save any of these reports. They may also be forwarded to a third-party data preparation service bureau or to a regional office for review.

20 FIG. 46 is a view of a business report 4604, which may be viewed as a web page. The business report provides a high level summary of various business decisions and settings and also notes any best practices violations. Users of this report may include product managers and portfolio managers.

25 FIG. 47 is a view of a technical report 4704, which may be viewed as a web page. This report provides a summary a various business decisions and settings supported by technical details such as tag, category, length, and values. This report highlights any best practices violations. Users of this report may include member technical staff or regional support representatives.

FIG. 48 is a view of a stand-in options report 4804. This report shows a summary of the stand-in options related to the personalization features. This report will assist the issuer in determining the appropriate stand-in options settings for the account. Users of this report may include regional support representatives in order to determine the appropriate stand-in parameters that should apply to this account.

The option for generating the data preparation output file (personalization data file) will only be displayed if the selected profile is in “active” state. The data preparation output file contains the member profile details that are incorporated into the data preparation process of personalization. The same file may be used on the personalization validation tool 344 to establish an issuer profile for personalization validation. In this embodiment both a comma separated values (CSV) format and an extensible markup language (XML) format are supported.

The comma separated values (CSV) format offers a way to collect data from any table so that it can be conveyed as input to another table-oriented application. It presents the required values in the table as a series of ASCII text lines. Each column value in the table is separated from the next column’s value by a comma. Each row starts a new line. Appendix A is a sample CSV data preparation output file. “T=” is used to designate a tag number. “C=” is used to designate a tag name category. “L=” is used to designate a tag length. “V=” is used to designate tag value.

The Extensible Markup Language (XML) format allows the exchange of data between incompatible systems. By converting data to the XML format, there is a significant reduction in the complexity of transferring this data, which makes it possible for this data to be read by many different types of applications and systems. Appendix B is a sample XML data preparation output file. The tag number, tag name category, tag length, and tag value are more easily labeled as shown in the example.

In the XML file in appendix B, line 20, defines a tag number. Line 21 defines a tag length. Line 22 defines a tag value. Other tags, tag lengths, and tag values are defined in other parts of the XML file.

Other embodiments of the invention may use other configurations,
5 such as it may be possible to connect the local systems to the web host through a network that is not the Internet. The requirement that the personalization assistant generates the data preparation table of values and the storage of the data preparation table of values 138 on the web host, helps to assure that all data preparation table of values 138 submitted to the preparation processing
10 device meet certain mandates to ensure compatibility. It is also possible to store the data preparation table of values on the local system and still provide ensure compatibility.

The invention provides a user friendly tool that is able to take business related answers to generate technical settings expressed in a data preparation
15 table of values, without requiring the understanding of the technical settings. The invention also provides a data preparation table of values that embodies the best practice of rules and that does not contain any prohibited combination of data elements.

Some of these features may have mandates or recommendations that
20 are set at a national, regional, or global level. For example, a global recommendation of a pin length may be for at least five characters. A region, such as Europe, may have a mandate that the pin length be at least six characters. A country within the region may require that pin length be at least seven characters. An issuer within country may be able to require that pin
25 length be at least eight characters. Since there are several different possible approval levels, recommendations and mandates at the different approval levels may quickly change. As a result, it is desirable to have a personalization assistant to assist users in applying any changes. The templates in the prior art would be too complex to allow changes to be applied
30 quickly and effectively. In addition, it would be difficult to continuously

update templates that are used on stand alone system. The look up table allows the recommendations and mandates to be more quickly changed than if the recommendations and mandates were placed in program logic. In addition, since the personalization assistant 320 is located at a centralized web host, it is much easier to provided updates globally, than trying to update templates on many stand alone systems.

A central system also allows e-mail communication with an issuer or the central system to obtain approvals at various stages. If used in a stand alone system, e-mail may also be used to obtain certain approval.

10 While this invention has been described in terms of several preferred embodiments, there are alterations, permutations, modifications and various substitute equivalents, which fall within the scope of this invention. It should also be noted that there are many alternative ways of implementing the methods and apparatuses of the present invention. It is therefore intended that
15 the following appended claims be interpreted as including all such alterations, permutations, modifications, and various substitute equivalents as fall within the true spirit and scope of the present invention.

Appendix A

Sample CSV File:

- 5 Organization: Demo Bank
PAN: 1111222233334444-1111222233334444
Profile: FullVSDC-Issuer-CreditProfile01
ProfileId: 000000000017
- 10 Application Default Action: T=9F52, C=VSDC, L=02, V=(0000)
Application Expiration Date: T=5F24, C=VSDC, L=03, V=(101011)
Application Identifier (AID): T=4F, C=VSDC, L=07, V=(A0000000031010)
Application Interchange Profile (VSDC): T=82, C=VSDC, L=02, V=(7C00)
- 15

Appendix B

Sample XML File:

```
5    <?xml version="1.0" encoding="ISO-8859-1" ?>
    <!DOCTYPE config [
      <!ELEMENT config      (tagelement+)>
      <!ELEMENT tagelement (tagname, tag, taglength, tagvalue)>
      <!ELEMENT tagname     (#PCDATA)>
10   <!ELEMENT tag          (#PCDATA)>
      <!ELEMENT taglength   (#PCDATA)>
      <!ELEMENT tagvalue     (#PCDATA)>
      <!ATTLIST config pan CDATA #IMPLIED>
      <!ATTLIST config profile CDATA #REQUIRED>
15   <!ATTLIST config profileid CDATA #REQUIRED>
      <!ATTLIST tagname category (VSDC|VLP|Domestic|International)
        "VSDC">
    ]>
    = <config pan="1111222233334444-1111222233334444" org="Demo
20   Bank" profile="FullVSDC-Issuer-CreditProfile01"
      profileid="000000000017">
      = <tagelement>
        <tagname category="VSDC">Application Default
          Action</tagname>
25   <tag>9F52</tag>
        <taglength>02</taglength>
        <tagvalue>0000</tagvalue>
      </tagelement>
      = <tagelement>
30   <tagname category="VSDC">Application Expiration
          Date</tagname>
        <tag>5F24</tag>
        <taglength>03</taglength>
        <tagvalue>101011</tagvalue>
35   </tagelement>
        <tagname category="VSDC">Application Identifier
          (AID)</tagname>
        <tag>4F</tag>
        <taglength>07</taglength>
40   <tagvalue>A0000000031010</tagvalue>
      </tagelement>
      = <tagelement>
        <tagname category="VSDC">Application Interchange
          Profile (VSDC)</tagname>
45   <tag>82</tag>
        <taglength>02</taglength>
```

```
<tagvalue>7C00</tagvalue>  
</tagelement>  
</config>
```